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09/882,933	06/14/2001	Paul J. Benning	10012050-1	9546

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EXAMINER
HODGES, MATTHEW P

ART UNIT	PAPER NUMBER
2879	

DATE MAILED: 07/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/882,933	BENNING ET AL.
	Examiner	Art Unit
	Matt P Hodges	2879

-- The MAILING DATE of this communication app ars on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-66 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-66 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 24 September 2001 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Specification

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Objections

Claim 18 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. In this case claim 18 includes only limitations of the parent claim 12 and thus does not further limit the base claim.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-11 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01.

Regarding claim 1 the omitted structural cooperative relationships are: the selection of the first opening and second opening with respect to the first voltage, second voltage, first distance, second distance, and a third distance. In this instance 5 variables are listed without sufficient association between the variables to reasonable establish a relationship that would

enable one of ordinary skill in the art to select the opening sizes required to create a spot size less than 40nm.

Claims 2-11 are rejected due to their dependency on rejected claim 1.

Claim 28 recites the limitation "one display device" in line 1. There is insufficient antecedent basis for this limitation in the claim.

For the purposes of examination it is assumed that claim 28 was intended to depend upon claim 27 instead of claim 25

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 12, 14, 27-29, 42- 44, and 57-59 are rejected under 35 U.S.C. 102(e) as being anticipated by Moyer et al. (US 6,137,213).

Regarding claims 12, 29, 44, and 59, Moyer discloses (see figure 2) an electrostatic lens including an emitter layer (102), a lens layer (112), a shield layer (118), and an anode (104) formed in that order. (Column 5 lines 20-35). All layers indicated above are separately held at potentials necessary to create the desired spot size on the anode for the FED. Further the relationships of the openings in the first and second layers along with the various positions of the

layers are determined by the desired spot size of the device. (Column 1 lines 11-19). The use of a shield layer with any positive voltage serves to reduce the electrostatic attraction between the lens layer and the anode.

Regarding claims 27, 28, 42, 43, 57, and 58, Moyer discloses the FEDs as disclosed for use in a Cathodoluminescent display. In this case, the FEDs form a display device that is further modified by a display signal forming an electronic device for the display of variable images.

Regarding claim 14, the emitter tips are of the spindt type as indicated in the drawings.

Claims 29, 33, 38, 42 and 43 are rejected under 35 U.S.C. 102(b) as being anticipated by Chen. (US 5,223,764).

Regarding claims 29, and 33, Chen discloses (see figure 6a) a field emission device including a cathode layer (K), a focusing lens further including a lens layer (G2) and a shield layer (G3), and an anode (G5) formed in that order. (Column 8 lines 7-24). Both the shield layer and the anode layer are held at the same potential. Further the diameter of the lens layer and the shield layer are substantially the same. Further the use of an anode potential on the shield layer necessarily reduces the electrostatic attraction between the lens layer and the anode layer.

Regarding claim 38, Chen discloses a voltage on the G2 grid of less than 0.12 times the Anode voltage. In this case the anode voltage is several KV meaning that the difference is much greater than 500 volts. (Column 6 lines 25-27).

Regarding claims 42 and 43, Chen discloses the electron emitter described in the rejection of claim 29 above for use in a Cathode Ray Tube as a display device. The display

device further including inputs for a variable signal allowing for use as a TV receiver for example.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-11, 13, 15-26, 30-41, 45-56, and 60-66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moyer et al. (US 6,137,213).

Regarding claim 1, Moyer discloses (see figure 2) an electrostatic lens including a cathode (102), a first conductive layer (112), a second conductive layer (118), and an anode (104) formed in that order. (Column 5 lines 20-35). All layers indicated above are separately held at potentials necessary to create the desired spot size on the anode for the FED. Moyer does not appear to specify the potentials of the second conductive layer and the anode being substantially equal. However the recitation of the second conductive layer being held at a second voltage substantially equal to the anode voltage has not been given patentable weight because is considered an intended used recitation. It has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. In this case there is no structural limitations distinguishing the claimed apparatus from the prior art by

the inclusion of the recitation in question. Further the relationships of the openings in the first and second layers along with the various positions of the layers are determined by the desired spot size of the device. (Column 1 lines 11-19). In this case it would have been obvious to one of ordinary skill in the art to create a spot size of 40nm by changing the distances between the various layers and altering the widths of the openings in the first and second layers as it well known in the art.

Regarding claims 2 and 3, Moyer does not appear to specify the distances, relative or absolute, between the various layers as claimed by the applicant. However the applicant fails to identify the use of the specific distances and ratios between the various layers to solve any problem or yield any unexpected result that is not within in the scope of the teachings relied upon. Further the variance of these distances is well known in the art as disclosed above to control the spot size and overall capacitance of the device. It would have been an obvious design choice to one having ordinary skill in the art to use the specific distances and ratios between the various layers as claimed by the applicant in the device as taught by Moyer, since such a modification would involve a mere optimization of the separation distances as is known in to provide the optimal spot size.

Regarding claim 4, Moyer does not appear to specify the distances, relative or absolute, between the various layers as claimed by the applicant in addition to the diameter of the holes in the first two layers being 7.2micrometers. However the applicant fails to identify the use of the specific distances and ratios between the various layers in addition to the diameter of the holes in the first two layers being 7.2micrometers to solve any problem or yield any unexpected result that is not within in the scope of the teachings relied upon. Further the variance of these

distances and hole diameters is well known in the art as disclosed above to control the spot size and overall capacitance of the device. It would have been an obvious design choice to one having ordinary skill in the art to use the specific distances and ratios between the various layers in addition to the diameter of the holes in the first two layers being 7.2micrometers as claimed by the applicant in the device as taught by Moyer, since such a modification would involve a mere optimization of the separation distances and hole diameters as is known in the art to provide the optimal spot size.

Regarding claim 5, Moyer does not appear to specify the force created between the cathode and the anode being less than about 0.3 Newtons/cm^2. However it is well known in the art to adjust the force between the cathode and anode by altering the potentials and spacings of the various layers including the cathode, anode, and gate electrode. Further reducing the force between the cathode and anode decreases the structural tension of the device thus enabling cheaper and easier manufacture. Thus it would have been obvious to one of ordinary skill in the art to limit the force created between the cathode and the anode to less than about 0.3 Newtons/cm^2 in the electrostatic lens disclosed by Moyer in order to provide for cheaper and easier manufacture.

Regarding claim 6, Moyer does not appear to specify the spot size being less than about 10 nm. However Moyer discloses the manipulation of the various spacings of the layers to control and minimize the spot size. Further reducing the spot size allows for advantageously increasing resolution in the end device. Thus it would have been obvious to one of ordinary skill in the art to change the spacings of the plates to create a spot size being less than about 10 nm in

the electrostatic lens disclosed by Moyer in order to advantageously increase resolution in the end device.

Regarding claim 7, the Examiner notes that the claim limitation that "wherein the sensitivity of the lens and shield geometry due to fabrication process variations is minimized" is drawn to a process of manufacturing which is incidental to the claimed apparatus. It is well established that a claimed apparatus cannot be distinguished over the prior art by a process limitation. Consequently, absent a showing of an unobvious difference between the claimed product and the prior art, the subject product-by-process claim limitation is not afforded patentable weight (see MPEP 2113). Therefore, it is the position of the examiner that it would have been obvious to one of ordinary skill in the art that the electrostatic lens disclosed by Moyer is at least a fully functional equivalent to the Applicant's claimed electrostatic lens as all structural limitations of the product are met in the prior art as taught.

Regarding claim 8, Moyer does not appear to specify the difference of the potentials of the second conductive layer and the first conductive layer being about 700 volts. However the recitation of the difference of the potentials of the second conductive layer and the first conductive layer being about 700 volts has not been given patentable weight because is considered an intended used recitation. It has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. In this case there is no structural limitations distinguishing the claimed apparatus from the prior art by the inclusion of the recitation in question. Therefore, it is the position of the examiner that it would have been obvious to one of ordinary skill in the art that the electrostatic lens disclosed by

Moyer is at least a fully functional equivalent to the Applicant's claimed electrostatic lens as all structural limitations of the product are met in the prior art as taught.

Regarding claim 9, the Examiner notes that the claim limitation that "wherein the fist conductive layer and the second conductive layer are formed using semiconductor thin-film technology" is drawn to a process of manufacturing which is incidental to the claimed apparatus. It is well established that a claimed apparatus cannot be distinguished over the prior art by a process limitation. Consequently, absent a showing of an unobvious difference between the claimed product and the prior art, the subject product-by-process claim limitation is not afforded patentable weight (see MPEP 2113). Therefore, it is the position of the examiner that it would have been obvious to one of ordinary skill in the art that the electrostatic lens disclosed by Moyer is at least a fully functional equivalent to the Applicant's claimed electrostatic lens as all structural limitations of the product are met in the prior art as taught.

Regarding claim 10, the emitter tips are of the spindt type as indicated in the drawings.

Regarding claim 11, Moyer does not appear to specify the use of flat emitter tips, however the use of flat emitter tips, as a substitute for spindt type emitter tips, is well known in the art. It has been held to be within the general skill of a worker in the art to select a known substitute on the basis of its suitability for the intended use as a matter of obvious design choice. Thus, it would have been obvious to one having ordinary skills in the art at the time the invention was made to use a flat type emitter instead of a spindt type emitter, since the selection of known substitutes for a known purpose is within the skill of the art.

Regarding claims 18, 33, and 48, Moyer discloses the device as claimed (see rejection of claims 12, 29, and 44, above) but does not appear to specify the use of holes in the shield and

lens layer held at substantially the same diameter. However the applicant fails to identify the use of holes in the shield and lens layer held at substantially the same diameter to solve any problem or yield any unexpected result that is not within in the scope of the teachings relied upon. Further the variance of hole diameters is well known in the art as disclosed above to control the spot size. In this case using hole diameters of the same size would beneficially limit off axis emittance from enabling cross talk in neighboring cells. It would have been an obvious design choice to one having ordinary skill in the art to use of holes in the shield and lens layer held at substantially the same diameter as claimed by the applicant in the device as taught by Moyer, since such a modification would involve a mere optimization of the hole diameters as is known in the art to beneficially limit off axis emittance from enabling cross-talk in neighboring cells and to limit spot size.

Regarding claims 13, 16, 17, 24, 30-32, 39, 45-47, 54, 60-63, and 66, Moyer discloses the device as claimed (see rejection of claims 12, 29, 44, and 59 above) but does not appear to specify the distances, relative or absolute, between the various layers as claimed by the applicant. However the applicant fails to identify the use of the specific distances and ratios between the various layers to solve any problem or yield any unexpected result that is not within in the scope of the teachings relied upon. Further the variance of these distances is well known in the art as disclosed above to control the spot size and overall capacitance of the device. It would have been an obvious design choice to one having ordinary skill in the art to use the specific distances and ratios between the various layers as claimed by the applicant in the device as taught by Moyer, since such a modification would involve a mere optimization of the separation distances as is known in to provide the optimal spot size.

Regarding claim 15, Moyer discloses the device as claimed (see rejection of claim 12 above) does not appear to specify the use of flat emitter tips, however the use of flat emitter tips, as a substitute for spindt type emitter tips, is well known in the art. It has been held to be within the general skill of a worker in the art to select a known substitute on the basis of its suitability for the intended use as a matter of obvious design choice. Thus, it would have been obvious to one having ordinary skills in the art at the time the invention was made to use a flat type emitter instead of a spindt type emitter, since the selection of known substitutes for a known purpose is within the skill of the art.

Regarding claims 19, 34, 49, and 64, Moyer discloses the device as claimed (see rejection of claims 12, 29, 44, and 59 above) but does not appear to specify the diameter of the hole in the first layer being 7.2micrometers. However the applicant fails to identify the use of the specific diameter of the hole in the first layer being 7.2micrometers to solve any problem or yield any unexpected result that is not within in the scope of the teachings relied upon. Further the variance of hole diameters is well known in the art as disclosed above to control the spot size of the device. It would have been an obvious design choice to one having ordinary skill in the art to use the diameter of the hole in the first layer being 7.2micrometers as claimed by the applicant in the device as taught by Moyer, since such a modification would involve a mere optimization of the hole diameter as is known in the art to provide the optimal spot size.

Regarding claims 20, 35, and 50, Moyer discloses the device as claimed (see rejection of claims 12, 29, and 44, above) but does not appear to specify the force created between the cathode and the anode being less than about 0.3 Newtons/cm^2. However it is well known in the art to adjust the force between the cathode and anode by altering the potentials and spacings of

the various layers including the emitter layer, anode, and lens electrode. Further reducing the force between the emitter layer and anode decreases the structural tension of the device thus enabling cheaper and easier manufacture. Thus it would have been obvious to one of ordinary skill in the art to limit the force created between the emitter layer and the anode to less than about 0.3 Newtons/cm^2 in the electrostatic lens disclosed by Moyer in order to provide for cheaper and easier manufacture.

Regarding claims 21, 22, 36, 37, 51, and 52, Moyer discloses the device as claimed (see rejection of claims 12, 29, and 44 above) but does not appear to specify the spot size being less than about 10 nm. However Moyer discloses the manipulation of the various spacings of the layers to control and minimize the spot size. Further reducing the spot size allows for advantageously increasing resolution in the end device. Thus it would have been obvious to one of ordinary skill in the art to change the spacings of the plates to create a spot size being less than about 10 nm in the electrostatic lens disclosed by Moyer in order to advantageously increase resolution in the end device.

Regarding claims 23, 38, and 53, Moyer discloses the device as claimed (see rejection of claims 12, 29, and 44 above) but does not appear to specify the difference of the potentials of the shield layer and the lens layer being about 500 volts. However the recitation of the difference of the potentials of the shield layer and the lens layer being about 500 volts has not been given patentable weight because is considered an intended used recitation. It has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. In this case there is no structural limitations distinguishing the claimed

apparatus from the prior art by the inclusion of the recitation in question. Therefore, it is the position of the examiner that it would have been obvious to one of ordinary skill in the art that the electrostatic lens disclosed by Moyer is at least a fully functional equivalent to the Applicant's claimed electrostatic lens as all structural limitations of the product are met in the prior art as taught.

Regarding claims 25, 26, 40, 41, 55, and 56, Moyer discloses the device as claimed (see rejection of claims 12, 29, and 44 above) but does not appear to specifically state the use of the FEDs as disclosed in a mass storage device, however Moyer does teach the use of the FED in other areas besides display devices. Further it is well known in the art to use field emitters in mass storage devices and is well known to use mass storage devices in electronic devices. Thus it would have been obvious to one having ordinary skill in the art to use the FED as disclosed by Moyer in Mass storage devices and electronic devices using the mass storage devices in improve the focusing characteristics and thus the accuracy and density of the mass storage device.

Regarding claim 65, Moyer discloses the device as claimed (see rejection of claims 63 above) but does not appear to specifically state the use of the FEDs as disclosed in a mass storage device, however Moyer does teach the use of the FED in other areas besides display devices. Further it is well known in the art to use field emitters in mass storage. Thus it would have been obvious to one having ordinary skill in the art to use the FED as disclosed by Moyer in Mass storage devices in improve the focusing characteristics and thus the accuracy and density of the mass storage device.

Claims 30-32, 34-37, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen. (US 5,223,764).

Regarding claims 30, 31, 32, and 39, Chen teaches the device as claimed (see rejection of claim 29 above) but does not appear to specify the distances, relative or absolute, between the various layers as claimed by the applicant. However the applicant fails to identify the use of the specific distances and ratios between the various layers to solve any problem or yield any unexpected result that is not within in the scope of the teachings relied upon. Further the variance of these distances is well known in the art as disclosed above to control the spot size and overall capacitance of the device. It would have been an obvious design choice to one having ordinary skill in the art to use the specific distances and ratios between the various layers as claimed by the applicant in the device as taught by Chen, since such a modification would involve a mere optimization of the separation distances as is known in to provide the optimal spot size.

Regarding claim 34, Chen teaches the device as claimed (see rejection of claim 29 above) but does not appear to specify the diameter of the hole in the lens being 7.2micrometers. However the applicant fails to identify the use of the diameter of the hole in the lens being 7.2micrometers to solve any problem or yield any unexpected result that is not within in the scope of the teachings relied upon. Further the variance of hole diameters is well known in the art to control the spot size. It would have been an obvious design choice to one having ordinary skill in the art to use a diameter of the hole in the lens being 7.2micrometers as claimed by the applicant in the device as taught by Chen, since such a modification would involve a mere optimization of the hole diameters as is known in the art to provide the optimal spot size.

Regarding claim 35, Chen teaches the device as claimed (see rejection of claim 29 above) but does not appear to specify the force created between the cathode and the anode being less than about 0.3 Newtons/cm^2. However it is well known in the art to adjust the force between the cathode and anode by altering the potentials and spacings of the various layers including the cathode, anode, and focus electrode. Further reducing the force between the cathode and anode decreases the structural tension of the device thus enabling cheaper and easier manufacture. Thus it would have been obvious to one of ordinary skill in the art to limit the force created between the cathode and the anode to less than about 0.3 Newtons/cm^2 in the electrostatic lens disclosed by Chen in order to provide for cheaper and easier manufacture.

Regarding claims 36 and 37, Chen teaches the device as claimed (see rejection of claim 29 above) but does not appear to specify the spot size being less than about 10 nm. However Chen teaches the manipulation of the various spacings of the lens and focusing electrodes to control and minimize the spot size. Further reducing the spot size allows for advantageously increasing resolution in the end device. Thus it would have been obvious to one of ordinary skill in the art to change the spacings of the plates to create a spot size being less than about 10 nm in the electrostatic lens disclosed by Chen in order to advantageously increase resolution in the end device.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Gibson et al. (US 5,557,596) discloses the use of FEDs in mass storage devices.

Kane et al. (US 5,191,217) discloses the use of a focus layer separated from the gate layer and charged with an independent power source.

Shim et al. (US 6,139,760) discloses the use of a focus layer between the gate layer and the anode layer.

Jones (US 5,619,097) discloses the interchangeable use of Spindt type or Flat type emitters in a FED.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matt P Hodges whose telephone number is (703) 305-4015. The examiner can normally be reached on 7:30 AM to 4:00 PM M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (703) 305-4794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7382 for regular communications and (703) 308-7382 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

mph
June 27, 2003

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